APPENDIX L – DMM COST BENEFIT ANALYSIS

Demand Management Measures
Cost-Benefit Analysis
ASSUMPTIONS COMMON TO ALL DMMS

General Assumptions

1) Each DMM is implemented by itself e.g. not combined with other DMMs
2) When unavailable in the 2005 UWMP, values were derived (as noted) from the ***BMP Cost and Savings Study, A Guide to Data and Methods for Cost-Effectiveness Analysis of Urban Water Conservation Best Management Practices*** , Prepared for the California Urban Water Conservation Council, A & N Technical Services, March 2005

Specific Assumptions

	Value	Units	Comments
Avoidable Supply Acquisition Costs	35	$/AF	See "Avoided Costs Calculation"
Avoided Water Capacity Expansion Cost	14	$/AF	See "Avoided Costs Calculation"
Avoided Wastewater Capacity Expansion Cost	207	$/AF	See "Avoided Costs Calculation"
Annual Water Chemical Costs	24,000	$	Per 2005 UWMP
Annual WW Chemical Costs	120,000	$	Per 2005 UWMP
Annual Energy Costs for Water System	548,837	$	Per 2005 UWMP
Environmental Benefits per AF of water saved	50	$/AF	Per 2005 UWMP
Agency Discount Rate	2.5	%	Per 2005 UWMP
Social Discount Rate	2	%	Estimate
Staff Hourly Rate including Overhead	75	$	Per 2005 UWMP

Values highlighted in pink on the following pages were assumed due to lack of data

Demand Management Measures
Cost-Benefit Analysis
AVOIDED COSTS CALCULATION

	ENR 20-Cities CCI
April 2011	9027
August 1996	5652
April 2000	6201

Discount Rate	2.5%	
Useful life	25	yrs
Capitalization Factor[1]	0.054	

	Estimated Costs							Added Capacity		
	Master Plan Costs	Master Plan Date	2011 Dollars	Percent of Capacity related to increase in Supply	Percent of Capacity Related to Indoor Water Use[4]	Costs directly impacted by Conservation	Discounted Annualized Costs	gpm	AF/Yr	Marginal Avoided Costs (AF)
Additional Supply[2]	$ 5,105,000	August 1996	$ 8,153,368	N/A	N/A	$ 8,153,368	$ 440,282	7880	12,711	**35**
Water Capacity Expansion[2]	$ 19,950,300	August 1996	$ 31,863,298	10%	N/A	$ 3,186,330	$ 172,062	7880	12,711	**14**
Wastewater Capacity Expansion[3]	$ 12,959,000	April 2000	$ 18,864,843	N/A	57%	$ 10,752,961	$ 580,660	1736	2,800	**207**

Notes:

(1) Compound Interest Tables for Capital Recovery Factor (A/P)
(2) From City's 1996 Water Master Plan, assuming Pre-2006 projects are implemented, excluding new Storage Reservoir & Pump Station (no longer needed)
(3) From City's 2000 Wastewater Treatment and Disposal Engineering Report
(4) Ratio of Average Day Demand to Max Day Demand

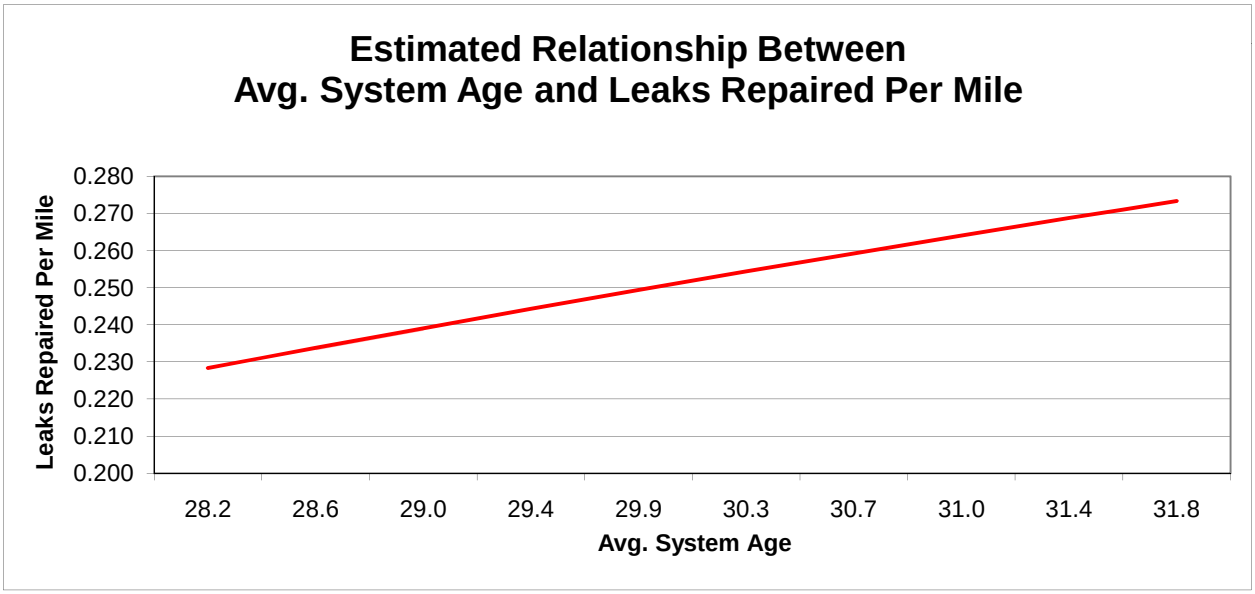
DMM 3 - System Water Audits, Leak Detection, and Repair
STEP 1: System Leak Repair History

1. Year system constructed: 1960
2. Average rate of system expansion: 2 %/yr

	Year	System Age	Avg. Age	Miles of Pipe	No. of Leak Repairs	Total Expenditure to Repair Leaks	No. Leaks Per Mile	Avg. Cost Per Repair
	1998	38	26.8	161	30	45,000	0.19	1,500
	1999	39	27.3	163	30	45,000	0.18	1,500
	2000	40	27.7	165	22	33,000	0.13	1,500
3.	2001	41	28.2	168	35	52,500	0.21	1,500
4.	2002	42	28.6	172	76	114,000	0.44	1,500
5.	2003	43	29.0	175	55	82,500	0.31	1,500
6.	2004	44	29.4	178	42	63,000	0.24	1,500
7.	2005	45	29.9	185	39	58,500	0.21	1,500
8.	2006	46	30.3	194	56	84,000	0.29	1,500
9.	2007	47	30.7	198	31	46,500	0.16	1,500
10.	2008	48	31.0	200		0	0.00	
11.	2009	49	31.4	202		0	0.00	
12.	2010	50	31.8	204		0	0.00	

	A^1	-0.120
	B^1	0.012
	R-Square	0.244

1,500



Notes:
(1) 1998 through 2007 data was used due to lack of data for 2008 to 2010.

DMM 3 - System Water Audits, Leak Detection, and Repair
STEP 2: Estimate Water Losses from Leaks

1. Avg. water loss from unrepaired system leak	2,284	HCF/leak/year
2. Average life of a leak without leak detection program	1.0	years
3. Average life of a leak with leak detection program	0.5	years

Simple Leak Volume Calculator (use this if your operations department cannot provide you a loss estimate)

System unaccounted water (UW) in 2010[(1)]	734	AF
Percent UW due to system leaks	30	%
Total water loss due to leaks in 2010	220	AF
Estimated number of system leaks in 2010	42	Leaks
Avg. water loss per leak	2,284	HCF/Leak-Yr

Notes:

(1) Calculated from unmetered residential accounts assuming same demand per account as metered accoun

DMM 3 - System Water Audits, Leak Detection, and Repair
STEP 3: Cost of Water Losses

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1. Marginal Source of Suppy		Groundwater Wells	
2. Avoidable Supply Acquisition Cost	$	35	/AF

Avoided Treatment & Distribution Capacity Costs

3. Avoided capacity expansion costs (dollars per AF of water saved by conservation) ($14 for Water Capacity; $207 for WW Capacity)	$	221	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

4. Total annual chemical costs (Total Chlorine and WWTP Chemicals Cost)[1]	$	144,000.00	/yr
5. Annual fixed costs for chemicals	$	-	/yr
6. Annual chemical costs not related to water production[1]	$	120,000.00	/yr
7. Avoidable chemical costs (Line 4 - Line 5 - Line 6)	$	24,000.00	/yr
8. Average annual treated water use[2]		12,568	AF
9. Unit Cost of Chemicals (Line 7 ÷ Line 8)	$	1.91	/AF

Avoided energy costs

10. Annual energy costs[1]	$	548,837.00	/yr
11. Annual fixed costs	$		/yr
12. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$		/yr
13. Avoidable energy costs (Line 10 - Line 11 - Line 12)	$	548,837.00	/yr
14. Average annual water use (from Line 8 above)		12,568.00	AF
15. Unit Cost of Energy (Line 13 ÷ Line 14)	$	43.67	/AF
16. Avoided Treatment & Distribution Variable Costs (Line 9 + Line 15)	$	45.58	/AF
17. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 16)	$	301.58	/AF

Environmental Benefits

18. Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$	50	/AF
19. Avoided Cost Per HCF (Line 17 + Line 18 ÷ 435.6)	$	0.81	/HCF

Notes:
(1) Per 2005 UWMP Addendum
(2) Per 2010 UWMP Chapter 3: Average of 2008 through 2010

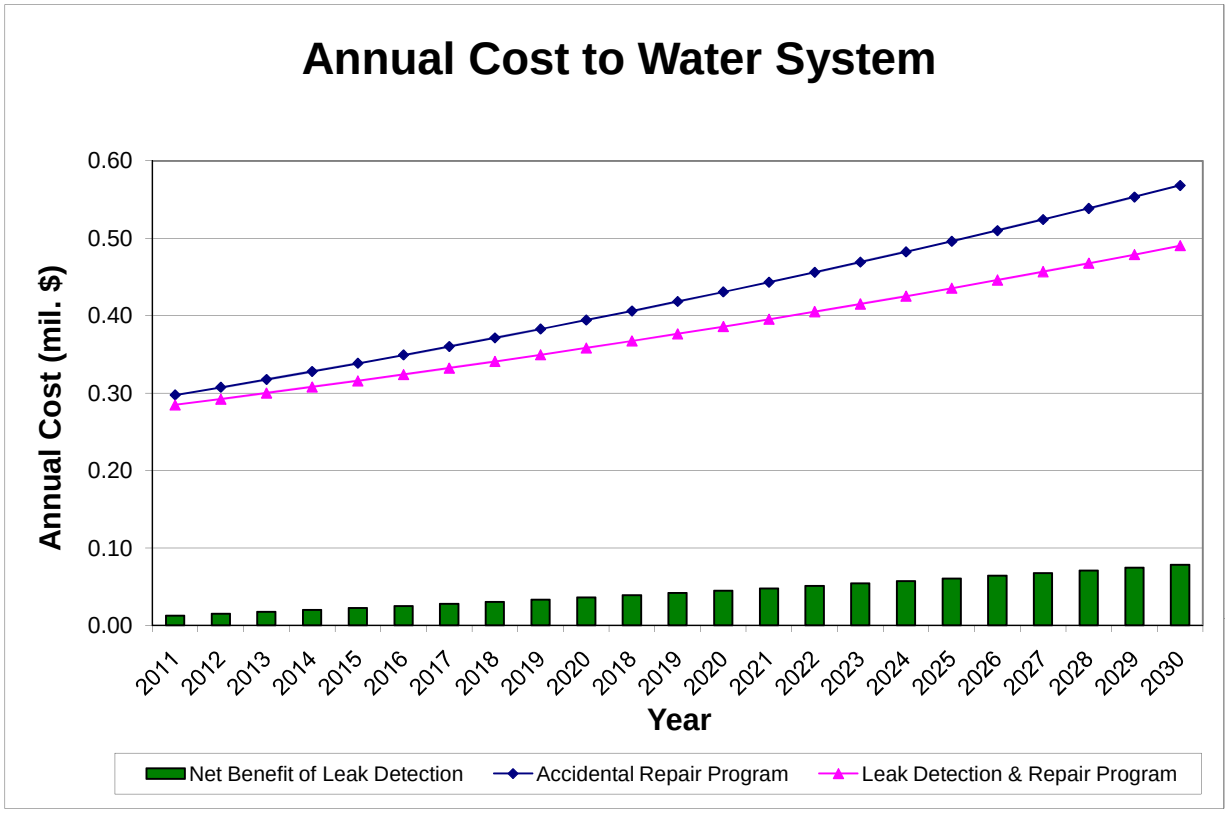
DMM 3 - System Water Audits, Leak Detection, and Repair
STEP 4: Cost of Leak Detection

Cost of leak detection per mile of pipe	$ 800	/mile
Agency discount rate	2.5	%

DMM 3 - System Water Audits, Leak Detection, and Repair
STEP 5: Model Results

	$ Millions
Annual Cost of Accidential Repair Program in 2011	$0.30
Annual Cost of Leak Detection & Repair Program in 2011	$0.28
Net annual benefit of Leak Detection & Repair Program in 2011	$0.01

Present Value Benefit Over Next 10 Years of Leak Detection & Repair Program	$0.75



DMM 6 High Efficiency Washing Machine Rebate Programs
STEP 1 - Annual Program Costs

Administration Costs

1.	Staff hours to administer the rebate program	200	hrs/yr
2.	Staff hourly rate, including overhead	$ 75.00	/hr
3.	Administration costs (Line 1 x Line 2)	$ 15,000	/yr

Washing Machine Rebate Costs

4.	Rebate (or utility incentive cost)	$ 100	/rebate
5.	Number of rebates distributed	200	/yr
6.	Total rebate cost (Line 4 x Line 5)	$ 20,000	/yr

Rebate Processing Costs

7.	Average rebate processing cost (if not included in Adn	$ 20	/rebate
8.	Total rebate processing cost (Line 5 x Line 7)	$ 4,000	/yr

Publicity Costs

9.	Marketing collateral cost (e.g., brochure design, printing, web services)	$ 4,000	/yr
10.	Advertising cost (i.e. newspaper, radio, TV, web)	$ 4,000	/yr
11.	Total publicity costs (Line 9 + Line 10)	$ 8,000	/yr

Evaluation and Followup Costs

12.	Labor & Consultant costs	$ 5,000	/yr
13.	**Total Costs** (Line 3 + Line 6 + Line 8 + Line 11 + Line 12)	$ 52,000	/yr

Program Cost Sharing

14.	Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ -	/yr
15.	**Net Agency Cost** (Line 13 - Line 14)	$ 52,000	/yr

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 2 - Water Savings Worksheet

	High-Efficiency Washing Machines	
1. Savings per machine (gallons per year per machine)	5,250.00	gpy/machine
2. Useful Life	10.0	yrs
3. Number of Rebates Distributed (from STEP 1 Line 5)	200	
4. Percent Free-riders	35	%/yr
5. Lifetime Savings	**20.94**	**AF**

(●) Use CUWCC Reliable Savings Estimat
( ) Use Own Estimate

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1.	Marginal Source of Suppy	Groundwater Wells	
2.	Avoidable Supply Acquisition Cost	$ 35	/AF

Avoided Treatment & Distribution Capacity Costs

3.	Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$ 14	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4.	Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$ 207.00	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

5.	Total annual chemical costs (Total Chlorine and WWTP Chemicals Cost)	$ 144,000.00	/yr
6.	Annual fixed costs for chemicals	$ -	/yr
7.	Annual chemical costs not related to water production	$ 120,000.00	/yr
8.	Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$ 24,000.00	/yr
9.	Average annual treated water use	12568	AF
10.	Unit Cost of Chemicals (Line 8 ÷ Line 9)	$ 1.91	/AF

Avoided energy costs

11.	Annual energy costs (Back Calculated based on SCE Well Tests)	$ 548,837.00	/yr
12.	Annual fixed costs	$ -	/yr
13.	Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$ -	/yr
14.	Avoidable energy costs (Line 11 - Line 12 - Line 13)	$ 548,837.00	/yr
15.	Average annual water use (from Line 9 above)	12,568.00	AF
16.	Unit Cost of Energy (Line 14 ÷ Line 15)	$ 43.67	/AF
17.	Avoided Treatment & Distribution Variable Costs (Line 10 + Line 16)	$ 45.58	/AF
18.	Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$ 301.58	/AF

Environmental Benefits

19.	Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$ 50	/AF

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 4 - Other Benefits and Costs

OTHER BENEFITS

Avoided Customer Energy Costs	High Efficiency Clothes Washer
1. Percent of residential hot water heated with gas (Source: http://websafe.kemainc.com/RASSWEB /DesktopDefault.aspx; data is for SCE)	89.5 %
2. Percent of residential dryers using gas (Source: http://websafe.kemainc.com/RASSWEB /DesktopDefault.aspx; data is for SCE)	61.8 %
2. Marginal cost per therm of gas	$ 1.50 /therm
3. Marginal cost per KWh of electricity	$ 0.12 /KWh
5. Customer Energy Benefit	$ 45.77 /Yr

Avoided Wastewater Utility Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

6. Avoided energy & chemical costs	$ 0 /AF of conserved water
7. Avoided wastewater capacity expansion	$ 0 /AF of conserved water
8. Total avoided wastewater utility costs (Line 6 + Line 7)	$ - /AF of conserved water

DMM 6 High Efficiency Washing Machine Rebate Progra
Step 5 - Discounting Information

Discount Rates (required)

1.	Agency Discount Rate	2.5 %
2.	Social Discount Rate	2.0 %

Annual Escalation Rates (optional)

3.	Avoided cost of water and wastewater	- %/yr
4.	Environmental benefits	- %/yr
5.	Energy cost	- %/yr

DMM 6 High Efficiency Washing Machine Rebate Programs
Step 6 - Summary of Costs & Benefits

Program Present Value Costs	**Agency Perspective**	**Society Perspective**
1. Total rebates distributed	200	200
2. Total water savings	20.9 AF	20.9 AF
3. Agency program costs	$52,000	$52,000
4. Customer program costs	NA	NA
5. Cost share	$0	NA
6. Net Program Cost	$52,000	$52,000
Program Present Value Benefits		
7. Agency supply & wastewater benefits	$5,528	$5,673
8. Environmental benefits	$916	$941
9. Customer program benefits	NA	$82,219
## Other utility benefits	NA	$0
## Total benefits	$6,444	$88,833
## **Net Present Value** (Line 11 - Line 6)	**($45,556)**	**$36,833**
## Benefit-Cost Ratio (Line 11 ÷ Line 6)	0.12	1.71
## Simple Unit Supply Cost (Line 6 ÷ Line 2)	$2,483 /AF	$2,483 /AF
## Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$2,837 /AF	$2,764 /AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is cost-effective to implement from the Society Perspective

DMM 9 CII Surveys
Step 1 - Annual Program Costs

		CII Surveys	
Administration Costs			
1.	Staff hours to administer the survey program	400.00	hrs/yr
2.	Staff hourly rate, including overhead	$ 75.00	/hr
3.	Administration costs (Line 1 x Line 2)	$ 30,000.00	/yr
Field Labor Costs			
4.	Field labor hours	3.00	hrs/srvy
5.	Field labor hourly rate, including overhe	$ 75.00	/hr
6.	Number of surveys	40.00	/yr
7.	Field labor cost (Line 4 x Line 5 x Line 6)	$ 9,000.00	/yr
Materials/ Outside Services Costs			
8.	Unit cost of materials (e.g., plumbing fixtures)	$ 75.00	/srvy
9.	Consulting Services Cost	$ -	/srvy
10.	Number of surveys (from Line 6)	40	/yr
11.	Total materials/outside services cost (Line 8 x Line 9)	$ 3,000.00	/yr
Publicity Costs			
12.	Marketing collateral cost (e.g., brochure design, printing, web services)	$ 5,000.00	/yr
13.	Advertising cost (i.e. newspaper, radio, TV, web)	$ 5,000.00	/yr
14.	Total publicity costs (Line 11 + Line 12)	$ 10,000.00	/yr
Evaluation and Followup Costs			
15.	Labor & Consultant costs	$ 10,000.00	/yr
16.	**Total Costs** (Line 3 + Line 7 + Line 10 + Line 13 + Line 14)	$ 62,000.00	/yr
Program Cost Sharing			
17.	Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ -	/yr
18.	**Net Agency Cost** (Line 15 - Line 16)	$ 62,000.00	/yr

DMM 9 CII Surveys
Step 2 - Water Savings

	CII Surveys	
1. Avg. Water Savings Per Survey	400.00	gpd
2. Avg. Water Savings Per Survey	0.45	AF/yr
4. Savings Decay	10.00	%/yr
5. Number of Surveys (from STEP 1 Line 6)	40.00	
6. Cumulative Savings	**166.33**	**AF**

DMM 9 CII Surveys
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1.	Marginal Source of Suppy (List name)	Groundwater Wells	
2.	Avoidable Supply Acquisition Cost	$ 35	/AF

Avoided Treatment & Distribution Capacity Costs

3.	Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$ 14	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4.	Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$ 207	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

5.	Total annual chemical costs (Total Chlorine and WWTP Chemicals Cost)	$ 144,000.00	/yr
6.	Annual fixed costs for chemicals	$	/yr
7.	Annual chemical costs not related to water production	$ 120,000.00	/yr
8.	Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$ 24,000.00	/yr
9.	Average annual treated water use	12568	AF
10.	Unit Cost of Chemicals (Line 8 ÷ Line 9)	$ 1.91	/AF

Avoided energy costs

11.	Annual energy costs (Back Calculated based on SCE Well Tests)	$ 548,837.00	/yr
12.	Annual fixed costs	$	/yr
13.	Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$	/yr
14.	Avoidable energy costs (Line 11 - Line 12 - Line 13)	$ 548,837.00	/yr
15.	Average annual water use (from Line 9 above)	12,568.00	AF
16.	Unit Cost of Energy (Line 14 ÷ Line 15)	$ 43.67	/AF
17.	Avoided Treatment & Distribution Variable Costs (Line 10 + Line 16)	$ 45.58	/AF
18.	Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$ 301.58	/AF

Environmental Benefits

19.	Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$ 50	/AF

DMM 9 CII Surveys
Step 4 - Other Benefits and Costs

OTHER BENEFITS

Avoided Wastewater Utility Variable Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

1. Avoided energy & chemical costs — $ 0 /AF of conserved water

Avoided Wastewater Utility Capacity Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits

2. Avoided wastewater capacity expansion — $ 0 /AF of conserved water

Customer Energy Benefits

3. Average reduction in energy purchases — $ 25 /Srvy/yr

OTHER COSTS

Customer participation costs	CII Surveys	
4. Average customer expenditures per survey[1] (e.g., cooling system modifications, etc)	$ 1707	/Survey
5. Number of surveys (from Line 8 of STEP 1)	40.00	/yr
6. Total customer costs (Line 2 x Line 3)	$ 68,280.00	/yr

Notes:
1) Per 2005 CUWCC BMP Cost Savings Study, Assuming Consultant Analysis and full implementation, Average cost to implement is $6,828; 25% actual implementation = $1,707

DMM 9 CII Surveys
Step 5 - Discounting Information

Discount Rates (required)

1.	Agency Discount Rate	2.5 %
2.	Social Discount Rate	2.0 %

Annual Escalation Rates (optional)

3.	Avoided cost of water and wastewater	- %/yr
4.	Environmental benefits	- %/yr
5.	Energy cost	- %/yr

DMM 9 CII Surveys
Step 6 - Summary of Benefits & Costs

Program Present Value Costs	**Agency Perspective**	**Society Perspective**
1. Total surveys	40	40
2. Total water savings	166.3 AF	166.3 AF
3. Agency program costs	$62,000	$62,000
4. Customer program costs	NA	68,280
5. Cost share	$0	NA
6. Net Program Cost	$62,000	$130,280
Program Present Value Benefits		
7. Agency supply & wastewater benefits	$42,598	$50,162
8. Environmental benefits	$7,063	$8,317
9. Customer energy benefits	NA	$8,128
## Other utility benefits	NA	$0
## Total benefits	$49,661	$66,607
## **Net Present Value** (Line 9 - Line 6)	**($12,339)**	**($63,673)**
## Benefit-Cost Ratio (Line 9 ÷ Line 6)	0.80	0.51
## Simple Unit Supply Cost (Line 6 ÷ Line 2)	$373 /AF	$783 /AF
## Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$439 /AF	$894 /AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is not cost-effective to implement from the Society Perspective

DMM 14 ULFT Replacement Programs
Step 1 - Annual Costs

Administration Costs

1. Staff hours to administer the rebate program	200 hrs/yr		
2. Staff hourly rate, including overhead	$ 75.00 /hr		
3. Administration costs (Line 1 x Line 2)	$ 15,000 /yr		

ULFT Costs

	Single-Family	Multi-Family
4. ULFT Cost (or incentive cost)	$ 100 /ULFT	$ 100 /ULFT
5. Number of ULFTs (or incentives) distributed	50 /yr	50 /yr
6. Total ULFT replacement cost (Line 4 x Line 5)	$ 5,000 /yr	$ 5,000 /yr

Incentive Processing Costs

7. Average rebate processing cost (if not included in Adn	$ 10 /ULFT
8. Total rebate processing cost (Line 5 x Line 7)	$ 1,000 /yr

Publicity Costs

9. Marketing collateral cost (e.g., brochure design, printing, web services)	$ 1,000 /yr
10. Advertising cost (i.e. newspaper, radio, TV, web)	$ 4,000 /yr
11. Total publicity costs (Line 9 + Line 10)	$ 5,000 /yr

Evaluation and Followup Costs

12. Labor & Consultant costs	$ 5,000 /yr
13. **Total Costs** (Line 3 + Line 6 + Line 8 + Line 11 + Line 12)	$ 36,000 /yr

Program Cost Sharing

14. Cost Share from Others (e.g., other agencies, grants, in-kind contrib.)	$ - /yr
15. **Net Agency Cost** (Line 13 - Line 14)	$ 36,000 /yr

DMM 14 ULFT Replacement Programs
Step 2 - Customer Water Savings

	Single-Family	Multi-Family
1. Avg. Persons Per Household	2.9	2.9
2. Avg. Savings per ULFT (gallons per day per ULFT)	22.9 gpd	50.2 gpd
3. Toilet Natural Replacement Rate	4.0 %/yr	4.0 %/yr
4. Number of ULFTs Distributed (from STEP 1 Line 5)	50	50
5. Percent Free-riders	35 %	35 %
6. 25-Year Savings	**13.3 AF**	**29.2 AF**

◉ Use CUWCC Reliable Savings Estimat
○ Use Own Estimate

DMM 14 ULFT Replacement Programs
Step 3 - Agency Benefits

Avoided Supply Acquisition Costs (include future avoided capital costs as appropriate)

1. Marginal Source of Suppy (List name)		Groundwater Wells	
2. Avoidable Supply Acquisition Cost	$	35	/AF

Avoided Treatment & Distribution Capacity Costs

3. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$	14	/AF

Avoided Wastewater Capacity Costs (*if service provided by agency*)

4. Avoided capacity expansion costs (dollars per AF of water saved by conservation)	$	207	/AF

Avoided Treatment & Distribution Variable Costs *(include wastewater services if provided by agency)*

Avoided chemical costs

5. Total annual chemical costs	$	144,000.00	/yr	
6. Annual fixed costs for chemicals	$		/yr	
7. Annual chemical costs not related to water production	$	120,000.00	/yr	
8. Avoidable chemical costs (Line 5 - Line 6 - Line 7)	$	24,000.00	/yr	
9. Average annual treated water use		12,568	AF	Source: 2005 UWMP
10. Unit Cost of Chemicals (Line 8 ÷ Line 9)	$	1.91	/AF	

Avoided energy costs

11. Annual energy costs	$	548,837.00	/yr
12. Annual fixed costs	$		/yr
13. Annual energy costs not related to water production (e.g., lighting, heating/cooling)	$		/yr
14. Avoidable energy costs (Line 11 - Line 12 - Line 13)	$	548,837.00	/yr
15. Average annual water use (from Line 9 above)		12,568.00	AF
16. Unit Cost of Energy (Line 14 ÷ Line 15)	$	43.67	/AF
17. Avoided Treatment & Distribution Variab (Line 10 + Line 16)	$	45.58	/AF
18. Total Supply & Wastewater Benefits (Line 2 + Line 3 + Line 4 + Line 17)	$	301.58	/AF

Environmental Benefits

19. Environmental benefit per AF saved (e.g. value of instream flow, improved water quality, avoided environmental mitigation for supply development or wastewater disposal)	$	50	/AF

DMM 14 ULFT Replacement Programs
Step 4 - Other Benefits & Costs

OTHER BENEFITS

Avoided Wastewater Utility Costs (IMPORTANT: do not include those listed in STEP 3 Agency Benefits)

1. Avoided energy & chemical costs	$ 0	/AF of conserved water
2. Avoided wastewater capacity expansion	$ 0	/AF of conserved water
3. Total avoided wastewater utility costs (Line 6 + Line 7)	$ -	/AF of conserved water

OTHER COSTS

Customer Participation Costs	Single Family ULFTs	Multi Family ULFTs
4. Average customer expenditures per ULFT (e.g., installation, disposal of old toilet)	$ 125 /ULFT	$ 125 /ULFT
5. Number of ULFTs distributed (from Line 5 of STEP 1)	50	50
6. Percent of Freeriders (from Line 5 of STEP 2)	35 %	35 %
7. Total customer costs (Line 4 x Line 5 x (1 - Line 6))	$ 4,062.50	$ 4,062.50

DMM 14 ULFT Replacement Programs
Step 5 - Other Benefits & Costs

Discount Rates (required)

1.	Agency Discount Rate	2.5 %
2.	Social Discount Rate	2.0 %

Annual Escalation Rates (optional)

3.	Avoided cost of water and wastewater	- %/yr
4.	Environmental benefits	- %/yr
5.	Energy cost	- %/yr

DMM 14 ULFT Replacement Programs
Step 6 - Review Results

Program Present Value Costs	**Agency Perspective**		**Society Perspective**	
1. Total ULFTs distributed	100		100	
2. Total water savings	42.5	AF	42.5	AF
3. Agency program costs	$36,000		$36,000	
4. Customer program costs	NA		$8,125	
5. Cost share	$0		NA	
6. Net Program Cost	$36,000		$44,125	
Program Present Value Benefits				
7. Agency supply & wastewater benefits	$9,940		$10,431	
8. Environmental benefits	$1,648		$1,729	
9. Other utility benefits	NA		$0	
## Total benefits	$11,588		$12,160	
## **Net Present Value** (Line 10 - Line 6)	**($24,412)**		**($31,965)**	
## Benefit-Cost Ratio (Line 10 ÷ Line 6)	0.32		0.28	
## Simple Unit Supply Cost (Line 6 ÷ Line 2)	$847	/AF	$1,038	/AF
## Discounted Unit Supply Cost (Line 6 ÷ discounted water savings)	$1,092	/AF	$1,276	/AF

This BMP is not cost-effective to implement from the Agency Perspective
This BMP is not cost-effective to implement from the Society Perspective